INFLUENCES ON PERSONAL AIR POLLUTION EXPOSURE. HOW CAN WE REDUCE EXPOSURE MISCLASSIFICATION?

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Background and Aims: Most epidemiological studies today work with exposure estimates that are at best based on outdoor air pollution averages at address locations. The aim of this study is to increase the knowledge of personal exposure, and to reduce potential exposure misclassification.

Methods: High resolution monitoring data of PM2.5 and PM10 has been simultaneously collected for personal, indoor, and outdoor pollution levels during 43 days of a daily routine for one individual; the indoor and personal monitoring data are accompanied by diaries. Relationships of personal, residential outdoor and residential indoor pollution are analyzed. Furthermore campaigns of simultaneous monitoring in transport micro-environments have been undertaken for bus-cycling comparisons (2 routes, 18 repeats each), as well as for walking-cycling comparisons (2 routes, 8 repeats each), accompanied by GPS recordings. Influences of traffic environments on personal exposure are investigated.

Results: Major differences between personal and residential outdoor pollution can be observed for the range and standard deviation of PM2.5 and PM10 levels, with personal exposure to PM2.5 showing a range (R) of 38.64µg/m³ and a standard deviation (St. D.) of 4.17µg/m³ (PM10: R = 175.13µg/m³, St. D. = 18.26 µg/m³) compared to 15.78µg/m³ (R) and 3.12µg/m³ (St. D.) at the residential outdoor location (PM10: R = 40.25µg/m³, St. D. = 8.74µg/m³). Comparisons both for the cycle-bus, as well as for the cycle-walk campaign show a higher mean and higher variation of pollution for the cyclist on all routes.

Conclusions: Comparing personal and residential outdoor pollution indicates that using residential outdoor PM levels as a proxy for personal exposure ignores the variation and the peak values of exposure a person might be exposed to during a daily routine, i.e. in traffic environments.